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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/758,807      | 01/16/2004  | Edward F. Chu        | 404490              | 6496             |

7590 02/15/2006

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| EXAMINER |
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CHANDRAN, BIJU INDIRA

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| ART UNIT | PAPER NUMBER |
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2835

DATE MAILED: 02/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|--------------------------------------|-----------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/758,807 | <b>Applicant(s)</b><br>CHU ET AL. |  |
|                              | <b>Examiner</b><br>Biju Chandran     | <b>Art Unit</b><br>2835           |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-5 and 8 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Moos et al. (US 6,144,286)

- Regarding claim 1, Moos et al. disclose an over-current protection apparatus (figure 2) with high voltage endurance (column 3, lines 9-25; column 7, lines 39-44), comprising: a first electrode (24) layer being continuous and uniform; a second electrode layer being continuous and uniform (unnumbered in figure 2); and a ceramic current-sensitive layer (22) sandwiched between the first and second electrode layers and comprising a basic matrix (column 2, line 50), dopants, conductors and sintering materials ('donor dopants' and 'acceptor dopants' described in column 2, lines 50-55 comprise these materials); the over-current protection apparatus having the following features: (a) a normal resistance of less than 10 ohms (column 7, line 16); (b) a resistance-jumping ratio of less than 1.3 (original resistance value recurring after high voltage test as described in column 7, lines 40-43, corresponds to a jumping ratio of 1, as defined in applicants specification page 5, lines 22-24). The apparatus disclosed by Moos et al. in figure 2 is thicker

than 2.5mm. However, Moos et al. does indicate that other shapes are possible (column 5, lines 25-40), and points out that the resistance decreases with decreasing thickness (column 1, lines 20-30). At the time of the invention, it would have been obvious to one of ordinary skill in the art to make the thickness of the apparatus of any value, including lower than 2.5mm, by routine experimentation to achieve the desired normal resistance values at a suitable size and cost targets.

- Regarding claim 2, Moos et al. discloses all the limitations of claim 1. However, the area of the over-current protection apparatus disclosed by Moos et al. is not less than 200mm<sup>2</sup>. But Moos et al. does indicate that other shapes are possible (column 5, lines 25-40), and provides the relationship between area, thickness and the resistance (column 1, lines 20-30). Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to make the area of the apparatus any value, even lower than 200mm<sup>2</sup>, by routine experimentation, to achieve the desired normal resistance values at a suitable size and cost targets.
- Regarding claim 3, Moos et al. further disclose that the Curie point of the over-current protection apparatus is less than 85°C (column 3, lines 49-51).
- Regarding claim 4, Moos et al. further disclose that the basic matrix is composed of barium titanate (column 2, line 50).

- Regarding claim 5, Moos et al. further disclose that the dopants are selected from the group substantially consisting of strontium, lead, beryllium, calcium and selenium (equation 4).
  - Regarding claim 8, Moos et al. further disclose that the sintering (column 5, lines 43-46) material is selected from the group substantially consisting of silicon, titanium and germanium (eqn. 4).
2. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moos et al. in view of Duan et al. (US 2004/0238795 A1). Moos et al. disclose all the limitations of claim 1, but do not disclose that the conductors are selected from a group substantially consisting of carbides of titanium, zirconium, niobium and tantalum. Duan et al. disclose an electrically conductive ceramic with titanium carbide as conductor. At the time of the invention, it would have been obvious to one of ordinary skill in the art to incorporate the titanium carbide conductor in the over-current protection apparatus disclosed by Moos et al. to make use of its excellent electrical conductivity and excellent mechanical properties (middle of paragraph 0009).
3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moos et al. in view of Yasutomi et al. (US 4,923,829). Moos et al. disclose all the limitations of claim 1, but do not disclose that the conductors are

selected from the group substantially consisting of silicides of titanium, zirconium, niobium and tantalum. Yasutomi et al. discloses a ceramic with conductors selected from a group substantially consisting of silicides of titanium, zirconium, niobium and tantalum (column 2, lines 46-58; the attached periodic table shows elements of the listed groups). At the time of the invention, it would have been obvious to one of ordinary skill in the art to incorporate the silicide conductors taught by Yasutomi et al. in ceramic of the apparatus disclosed by Moos et al. to enable forming complex shapes while minimizing the change in shape after sintering (column 1, lines 10-15).

[illegible]

4. Claim 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moos et al. in view of Chu et al. (US 2003/0067054 A1).
- Regarding claim 9, Moos et al. discloses all the limitations of claim 1, and further disclose that the electrode layer is made of a metal, and stress the importance of its low electrical resistance (column 5, lines 47-64). However, Moos et al. does that these electrode layers are selected from a group substantially consisting of nickel-phosphorus alloy, silver, aluminum, gold, gallium-iodine alloy and zinc-silver alloy. Chu et al. disclose an over current protection device with electrode layers selected from a group consisting of gold, aluminum and nickel alloy (paragraph 0019). At the time of the invention, it would have been obvious to one of ordinary skill in the art to incorporate the electrode layers taught by Chu et al. in the apparatus disclosed by Moos et al. to make use of the low electrical resistance of these electrode materials.
  - Regarding claim 10, Moos et al. discloses all the limitations of claim 1, and further disclose that the electrode layer is made of a metal, and stress the importance of the low interfacial contact resistance between the ceramic and the metal (column 5, lines 47-64). However, Moos et al. does not expressly disclose that the process of formation of these electrode layers. Chu et al. disclose that the metal electrode layers are made by processes like electroplating, sputtering etc. If the electrodes

Art Unit: 2835

of Moss et al. are not formed by electroplating, plasma sputtering, flame sputtering, supersonic soldering or thick film printing, it would have been obvious to one of ordinary skill in the art at the time of the invention, to form the electrodes on the ceramic by electroplating or sputtering as taught by Chu et al., to make use of its ability to produce conformal coatings at a low cost (§2.2, Ruythooren et al., Electrodeposition for the synthesis of Microsystems, J. Micromech. Microeng. V10, p101, 2000).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Biju Chandran whose telephone number is (571) 272-5953. The examiner can normally be reached on 8AM - 5PM. Mon-Fri.

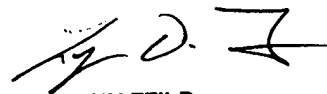
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2835

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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